

Original Research

Young Adults and Eating Away from Home: Associations with Dietary Intake Patterns and Weight Status Differ by Choice of Restaurant

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ABSTRACT

Background Young adults report frequent away-from-home eating; however, little is known regarding what types of restaurants are patronized or whether associations with dietary intake and weight status differ according to restaurant type.

Objective This cross-sectional study in a diverse sample of young adults examines sociodemographic differences in the frequency of eating at different types of fast-food and full-service (server brings food to table) restaurants. In addition, this study examines whether associations between away-from-home eating, dietary intake, and weight status differ according to restaurant type.

Design There were 1,030 men and 1,257 women (mean age = 25.3 years) who participated in Project EAT-III (Eating and Activity in Teens and Young Adults). Participants were members of a longitudinal cohort who completed baseline surveys at schools in Minneapolis/St Paul, MN, and completed the EAT-III surveys online or by mail in 2008-2009.

Main outcome measures Height, weight, and usual dietary intake were self-reported.

Statistical analyses performed Regression models adjusted for sociodemographic characteristics were used to examine associations between frequency of restaurant use, dietary intake, and weight status.

Results More frequent use of fast-food restaurants that primarily served burgers and french fries was associated with higher risk for overweight/obesity; higher intake of total energy, sugar-sweetened beverages, and fat; and with lower intake of healthful foods and key nutrients. For example, those who reported burger-and-fries restaurant use on three or more occasions per week consumed nearly one additional sugar-sweetened beverage per day compared to those who reported burger-and-fries restaurant use on less than one occasion per week. More frequent use of fast-food restaurants that primarily served sandwiches/subs was related to a few markers of poorer diet quality, but unrelated to weight status. More frequent use of full-service restaurants was also unrelated to weight status and related to higher intake of vegetables.

Conclusions There may be a need for interventions to promote healthier food choices among young adults who report frequent burger-and-fries restaurant use.

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Young adults (aged 20 to 29 years) consume approximately 40% of their total daily energy away from home; thus, the foods and beverages selected at restaurants may have a considerable influence on overall dietary quality (1). Research investigating dietary patterns during young adulthood has found that eating at fast-food restaurants occurs an average of two to three times per week (2); however, few studies have examined what types of fast-food restaurants are patronized or how frequently young adults purchase food at full-service restaurants (3). The availability of healthful and energy-dense menu options likely differs between fast-food restaurants and full-service restaurants (4), and among fast-food restaurants according to the type of food served (eg, burgers and french fries, deli sandwiches, or Mexican entrees). Therefore, the implications of eating away from home for dietary intake and weight status could differ according to the types of restaurants patronized by young adults.

Although several studies have found frequent away-from-home eating is associated with higher daily energy intake (5-10), poorer diet quality (5-7,10-13), and greater weight gain (2,14-16), few studies have considered if these associations differ according to restaurant type. One study among adults, adolescents, and children found that meals consumed away from home were higher in energy compared to meals prepared at home, regardless of if they were purchased at a fast-food or full-service restaurant (9). However, another study found that dining at nonfast-food restaurants (eg, full-service restaurants) was associated with higher fruit and vegetable consumption among non-Hispanic black adolescents (17). Furthermore, studies suggest that residents in communities with greater access to full-service restaurants have lower risk

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for obesity, consume more fruits and vegetables, and are more likely to meet dietary recommendations for saturated fat (18-20). These relationships were found to exist above and beyond differences in the sociodemographic characteristics of neighborhood residents, suggesting the findings were not simply an artifact of disparities in the availability of healthy foods (21). Additional studies are needed to clarify these findings as proximity to restaurants may not be a major influence on patterns of actual restaurant use among young adults (22).

Our study was designed to examine sociodemographic differences in the frequency of eating at different types of fast-food and full-service restaurants in a diverse sample of young adults. Fast-food restaurants were defined as establishments that provide limited service and require customers to place orders and pay before eating at a counter or table. Full-service restaurants were, in contrast, defined as establishments where customers are seated and meals are brought to a table by a server. In addition, this study aimed to examine whether associations between away-from-home eating, dietary intake, and weight status differ according to restaurant type. A better understanding of these relationships can help to inform the design of nutrition interventions and target relevant health behavior messages for young adults.

METHODS

Sample and Study Design

Data for this cross-sectional analysis were drawn from Project EAT-III (Eating and Activity in Teens and Young Adults), the third wave of an observational study designed to examine dietary intake, physical activity, weight-control behaviors, weight status, and factors associated with these outcomes among diverse young adults. At baseline (1998-1999), a total of 4,746 junior and senior high school students at 31 public schools in the Minneapolis/St Paul metropolitan area of Minnesota completed surveys and anthropometric measures (23,24). Ten years later, original participants were mailed letters inviting them to complete online or paper versions of the Project EAT-III survey and a food frequency questionnaire (FFQ). A total of 2,287 young adults completed the Project EAT-III survey between November 2008 and October 2009, representing 66.4% of participants who could be contacted (48.2% of the original school-based sample) (25). All study protocols were approved by the University of Minnesota's Institutional Review Board Human Subjects Committee.

Survey Development

The original Project EAT survey (24) that was used to assess determinants of dietary intake and weight status among adolescents was modified at follow-up to improve the relevance of items for young adults. New items were also added to the Project EAT-III survey to allow for investigating areas of growing research interest such as frequency of restaurant use. Four focus groups were conducted to pretest an initial draft of the Project EAT-III survey. Feedback from the 27 young adult participants was used to reword or eliminate problematic survey measures and expand on topic areas of perceived importance

prior to additional pilot testing. A revised survey was pilot tested with a different sample of 66 young adults to examine test-retest reliability over a period of 1 to 3 weeks. Additional details of the survey development process are described elsewhere (26).

Restaurant Use. Frequency of eating food from full-service restaurants and five categories of fast-food restaurants (ie, burger-and-fries, fried chicken, Mexican, pizza, and sandwich/sub) was assessed on the Project EAT-III survey with the question: "In the past month, how often did you eat something from the following types of restaurants (include take-out and delivery)?" Examples of quick-service and fast casual (eg, Panera Bread, St Louis, MO) restaurant chains were provided for each type of fast-food restaurant. Response options were "never/rarely," "one to three times per month," "one to two times per week," "three to four times per week," "five to six times per week," and "one or more times per day." This measure was adapted from a screener previously developed to assess restaurant use among adolescents (27). The test-retest reliability of reported frequencies among young adults varied according to the type of food served at restaurants, ranging from $r=0.43$ (pizza) to $r=0.83$ (fried chicken) (26).

Dietary Intake. A semi-quantitative FFQ was administered at the same time as the Project EAT-III survey to assess usual past year intake of fruit, vegetables, dark green/orange vegetables, whole grains, milk products, and sugar-sweetened beverages (28). A daily serving was defined as the equivalent of $\frac{1}{2}$ c for fruit and vegetables, 16 g for whole grains, and 1 c for milk products. For sugar-sweetened beverages, a serving was defined as the equivalent of 1 glass, bottle, or can. In addition, the FFQ was used to assess usual daily intake of total energy, total fat (percent of total energy), saturated fat (percent of total energy), sodium (milligrams), fiber (grams), and calcium (milligrams). Nutrient intakes were determined in 2009 by the Nutrition Questionnaire Service Center at the Harvard School of Public Health using a specially designed database, primarily based on the United States Department of Agriculture's Nutrient Database for Standard Reference (release 19). Previous studies have examined and reported on the reliability and validity of intake estimates (29,30). Responses to the FFQ were excluded if participants reported a biologically implausible level of total energy intake (<500 kcal/day or $>5,000$ kcal/day).

Weight Status. Weight status was assessed using self-reported height and weight, from which body mass index (BMI) was calculated. Self-report of height and weight (test-retest $r=0.99$ for height and weight) were validated in a subsample of 63 male and 62 female participants in Project EAT-III for whom height and weight measurements were completed by trained research staff. Results showed very high correlations between self-reported BMI and measured BMI in males ($r=0.95$) and females ($r=0.98$). Weight status was defined according to current BMI guidelines for adults (overweight or obese: BMI ≥ 25 ; obese: BMI ≥ 30) (31).

Sociodemographic Characteristics. Sociodemographic characteristics were self-reported and included sex, age, race/ethnicity, family socioeconomic status (SES), current employment, post-secondary student status, and parental

status. SES was based primarily on parent educational level, defined by the higher level of either parent at baseline (23,32). Current employment was assessed with the question: "How many hours a week do you currently work for pay?" Young adults who reported working ≥ 40 hours/week were categorized as employed full-time. Post-secondary student status in the past year was reported according to whether young adults were enrolled full-time or part-time in a two-year college, 4-year college, or graduate degree program. Responses were dichotomized for analysis (student or not a student). Parental status was assessed with the question: "How many children do you have (including step-children or adopted children)?"

Physical Activity. Physical activity was also examined as a covariate in analytic models where weight status was the outcome of interest as some research has found that activity patterns may be associated with restaurant use (33). Energy expended in physical activity was assessed using questions adapted from the widely used Godin Leisure-Time Exercise Questionnaire (34). Three survey items individually assessed strenuous, moderate, and mild activity, asking "In a usual week, how many hours do you spend doing the following activities?" (Response options included: none, less than $\frac{1}{2}$ hour, $\frac{1}{2}$ to 2 hours, $2\frac{1}{2}$ to 4 hours, $4\frac{1}{2}$ to six hours, and ≥ 6 hours). Strenuous activity was described as activity during which the heart beats rapidly, moderate activity was described as not exhausting, and mild activity was described as an activity requiring little effort. Examples of specific activities were given after each question. Each response was assigned a midpoint value and responses were then summed to compute weekly hours of physical activity.

Statistical Analyses

Descriptive statistics were calculated to determine the percentage of young adults that ate from different types of restaurants at least once per week. The χ^2 statistic was used to examine differences in restaurant dining patterns according to characteristics of young adults. For full-service restaurants and the two most patronized types of fast-food restaurants (ie, burger-and-fries, sandwich/sub), linear and logistic regression models were used to examine associations between frequency of restaurant use (<1 time/week, 1 or 2 times/week, or ≥ 3 times/week) and the outcomes of interest. Regression models were adjusted for sociodemographic characteristics (Model 1) and additionally adjusted for the frequency of eating from other restaurants to account for overall frequency of restaurant use (Model 2). For Model 2, dietary intake outcomes were also adjusted for total energy using the nutrient density approach (35). When the dietary outcome variable of interest exhibited positive skewness, testing was carried out using the square root transformation. Regression models used to examine associations with weight status were examined with and without additional adjustment for energy expended in physical activity.

Because attrition from the baseline sample (1998-1999) did not occur at random, in all analyses, the data were weighted using the response propensity method (36). When compared to nonrespondents in Project EAT-III, respondents were more likely to be female, white,

younger in age, and of higher SES. Response propensities (ie, the probability of responding to the Project EAT-III survey) were estimated using a logistic regression of response at EAT-III on a large number of predictor variables from the baseline Project EAT survey. Weights were additionally calibrated so that the weighted total sample sizes used in analyses accurately reflect the actual observed sample sizes for men and women. The weighting method resulted in estimates representative of the demographic make-up of the original school-based sample, thereby allowing results to be more fully generalizable to the population of young people in the Minneapolis/St Paul metropolitan area. A 99% confidence level was used to interpret the statistical significance of probability tests, corresponding to a P value <0.01 . Analyses were conducted using the Statistical Analysis System (SAS, version 9.1, 2002-2003, SAS Institute Inc, Cary, NC).

RESULTS

A total of 1,030 men and 1,257 women with a mean age of 25.3 ± 1.7 years were included in the sample for the current study. The racial/ethnic backgrounds of the participants were as follows: 48.4% white, 18.6% African American, 19.6% Asian, 5.9% Hispanic, 3.3% Native American, and 4.2% mixed or other race/ethnicity. The sample was also well distributed across categories of SES: 37.0% low or low-middle, 26.2% middle, and 36.8% upper-middle or high.

Patterns of Restaurant Use

Young adults reported eating food from a restaurant an average of three to four times per week. Nearly all young adults (95%) reported eating something from one or more type of restaurant in a given week and, on average, reported eating something from 1.3 different types of restaurants in a given week (range=0 to 6). For each type of restaurant, Table 1 shows the proportion of young adults in different sociodemographic groups who reported at least weekly use. Although most young adults (88%) reported eating food from one or more type of fast-food restaurant at least once per week, just one third of young adults reported eating food from a full-service restaurant this often. Approximately one third (30%) of young adults reported eating food from a burger-and-fries fast-food restaurant at least once per week. A similar percentage of young adults (29%) reported eating food from a sandwich/sub shop at least weekly. In contrast, fewer than one in five young adults reported weekly use of fast-food restaurants that primarily served fried chicken, Mexican food, or pizza. Given the less frequent use of these fast-food restaurants, subsequent analyses focused on the use of full-service restaurants and fast-food restaurants that primarily served hamburgers and french fries or sandwiches/subs.

Full-service restaurant use was significantly related to SES and parental status. Nearly 40% of young adults from high SES backgrounds reported at least weekly full-service restaurant use compared to 25% of young adults from low SES backgrounds. Similarly, 37% of young adults with no children reported full-service res-

Table 1. Percentage reporting restaurant use at least once per week according to sociodemographic characteristics of young adult participants in Project EAT-III (Eating and Activity in Teens and Young Adults)

Characteristic	n	Any restaurant ^a	Any sit-down ^b	Any fast food ^c	Burger-and-fries	Fried chicken	Mexican	Pizza	Sandwich or sub
← % ^d →									
Total	2,287	95.1	32.7	88.0	30.5	9.4	17.0	17.0	29.4
Sex									
Male	1,030	95.9	32.8	92.2	37.8	10.9	21.5	20.6	35.2
Female	1,257	94.3	32.6	84.6	24.5	8.2	13.4	14.0	24.8
P value		0.09	0.90	<0.001	<0.001	0.02	<0.001	<0.001	<0.001
Age (y)									
20-24	689	96.2	32.0	90.1	35.2	13.6	19.7	18.1	29.2
25-31	1,546	94.5	33.7	87.0	28.1	6.8	15.6	16.3	29.2
P value		0.10	0.45	0.05	<0.001	<0.001	0.02	0.28	0.96
Race									
African American	420	94.0 ^w	27.5	88.1	40.2 ^{xy}	19.3 ^x	24.1 ^{xy}	18.5	31.3
Asian	442	93.0 ^w	31.0	84.5	27.3 ^{wz}	14.5 ^x	12.3 ^w	12.3	24.4
Hispanic	133	100.0 ^w	27.1	93.0	39.7 ^{yz}	12.1 ^x	22.3 ^{wy}	22.9	33.1
Native American	74	96.9 ^w	34.7	95.5	41.3 ^{wy}	6.3 ^{wx}	15.6 ^{wy}	19.1	33.8
White	1,094	96.1 ^w	36.2	88.9	25.9 ^w	2.9 ^w	16.4 ^w	17.2	30.6
Mixed/other ^e	96	91.0 ^w	27.9	84.4	37.4 ^{wy}	19.0 ^x	11.4 ^{wy}	20.5	24.0
P value		0.004	0.02	0.02	<0.001	<0.001	<0.001	0.04	0.08
Socioeconomic status									
Low	814	95.1	25.5 ^w	89.3	35.0 ^w	12.8 ^w	18.3	18.1	30.6
Middle	577	95.3	35.3 ^x	87.2	30.5 ^{wy}	11.2 ^w	17.4	16.5	27.5
High	811	95.4	39.3 ^x	88.4	25.8 ^{xy}	3.9 ^x	15.6	16.5	30.2
P value		0.97	<0.001	0.54	<0.001	<0.001	0.34	0.63	0.42
Student status									
Student	762	95.1	36.1	86.5	25.9	8.7	15.4	14.9	29.2
Nonstudent	1,504	95.2	30.8	88.9	32.7	9.4	17.7	18.0	29.6
P value		0.94	0.01	0.12	0.001	0.57	0.17	0.07	0.84
Employment status									
Not employed	246	90.7 ^w	27.3	84.7	31.1	8.0	15.9	18.0	17.6 ^w
Part-time	758	95.0 ^{wx}	32.6	86.6	29.1	8.8	18.1	18.8	30.7 ^x
Full-time	1,137	96.3 ^x	33.9	90.0	31.8	9.2	16.5	15.8	32.4 ^x
P value		0.002	0.14	0.03	0.46	0.82	0.61	0.23	<0.001
Parental status									
No children	1,528	95.8	37.3	87.7	28.0	7.9	16.3	16.0	31.0
One or more child	741	93.4	22.8	88.9	35.7	12.6	18.5	19.1	26.7
P value		0.03	<0.001	0.42	<0.001	<0.001	0.18	0.07	0.04
Weight status^f									
Not overweight	1,035	92.6 ^w	35.8	83.2 ^w	24.2 ^w	7.6	14.6 ^w	16.4	27.7
Overweight	626	97.6 ^x	31.2	91.7 ^x	33.4 ^x	10.1	18.0 ^{wx}	15.8	31.0
Obese	483	97.1 ^{wx}	30.5	93.7 ^x	41.2 ^x	11.6	24.1 ^x	18.8	32.5
P value		<0.001	0.05	<0.001	<0.001	0.03	<0.001	0.36	0.12

^aEating from one or more type of full-service restaurant or fast-food restaurant.

^bEating from a full-service restaurant, excluding burger-and-fries restaurants, fried chicken restaurants, Mexican restaurants, pizza places, and sandwich or sub shops.

^cEating from one or more type of fast-food restaurant, including burger-and-fries restaurants, fried chicken restaurants, Mexican restaurants, pizza places, and sandwich or sub shops.

^dAll percentages are weighted to reflect the probability of responding to the EAT-III survey.

^eIncludes respondents who reported their race as Hawaiian/Pacific Islander.

^fBased on body mass index (BMI) calculated as kg/m² (not overweight: BMI <25.0, overweight: BMI 25.0-29.9, and obese: BMI ≥30.0).

^{wxyz}Values with unlike superscript letters (w, x, y, z) were significantly different at *P*<0.001.

restaurant use at least once per week compared to 23% of young adults who were parents. Sex, age, race/ethnicity, employment status, and weight status were not significantly related to full-service restaurant use.

Overall, fast-food restaurant use significantly differed

by sex. Approximately 92% of male young adults reported at least weekly fast-food restaurant use compared to 85% of female young adults. A similar pattern was observed for burger-and-fries restaurants and sandwich/sub shops. At least weekly use was reported by more than one-third

Table 2. Full-service restaurant use and daily mean \pm standard error (SE) dietary intakes of young adult participants in Project EAT-III (Eating and Activity in Teens and Young Adults)

	Full-Service Restaurant Use ^a			Model 1 ^a		Model 2 ^b	
	<1 time n=1,344	1-2 times n=488	≥ 3 times n=140	F	P value	F	P value
	\longleftrightarrow mean \pm SE \longleftrightarrow						
Food (servings)^c							
Fruit	2.03 \pm 0.05	1.98 \pm 0.08	2.03 \pm 0.17	0.15	0.86	0.57	0.56
Vegetables	2.23 \pm 0.05	2.42 \pm 0.09	2.60 \pm 0.17	4.83	0.008	6.19	0.002
Dark-green/orange vegetables	0.66 \pm 0.02	0.72 \pm 0.03	0.84 \pm 0.06	4.41	0.01	5.44	0.004
Milk products	1.96 \pm 0.04	1.84 \pm 0.07	1.86 \pm 0.14	1.32	0.27	2.54	0.08
Whole grains	1.90 \pm 0.04	1.95 \pm 0.07	1.61 \pm 0.14	2.75	0.06	4.31	0.01
Sugar-sweetened drinks	0.87 \pm 0.03	0.85 \pm 0.06	0.88 \pm 0.11	0.48	0.62	3.01	0.05
Nutrients							
Energy (kcal)	2,061 \pm 24	2,155 \pm 39	2,263 \pm 76	4.93	0.01	0.82	0.44
Energy from fat (%)	30.1 \pm 0.2	30.3 \pm 0.3	31.0 \pm 0.5	1.45	0.23	0.46	0.63
Energy from saturated fat (%)	10.4 \pm 0.1	10.2 \pm 0.1	10.6 \pm 0.2	1.27	0.28	2.37	0.09
Sodium (mg)	2,249 \pm 29	2,350 \pm 48	2,480 \pm 95	4.22	0.01	0.41	0.66
Fiber (g)	18.8 \pm 0.3	20.0 \pm 0.5	19.3 \pm 1.0	2.65	0.07	4.16	0.01
Calcium (mg)	1,027 \pm 16	1,001 \pm 26	1,050 \pm 51	0.20	0.82	1.15	0.32

^aThe weighted linear regression model is adjusted for sex, race/ethnicity, socioeconomic status, age, employment status, student status, and parental status.

^bThe weighted linear regression model is adjusted for the covariates in Model 1 as well as total energy intake (for all outcomes with the exceptions of energy, energy from fat, and energy from saturated fat) and the frequency of eating from other restaurants.

^cA daily serving was defined as the equivalent of 1/2 c for fruit and vegetables, 16 g for whole grains, and 1 c for milk products. For sugar-sweetened beverages, a serving was defined as the equivalent of one glass, bottle, or can.

of young men compared to 25% of young women for burger-and-fries restaurants and for sandwich/sub shops. Young adults who were employed full- or part-time were also significantly more likely than those who were not employed to eat food from a sandwich/sub shop at least weekly. Young adults in their early 20s; those from low SES backgrounds; those who reported African American, Hispanic, or Native American race/ethnicity; nonstudents; parents; and those who were obese were most likely to report at least weekly burger-and-fries restaurant use.

Restaurant Use and Dietary Intake

After adjusting for sociodemographic characteristics, more frequent full-service restaurant use was associated with higher intake of vegetables (Table 2, Model 1). Compared to young adults who reported full-service restaurant use <1 time per week, an average of 0.4 additional daily vegetable servings were consumed by those who reported full-service restaurant use on three or more occasions per week. A similar association was observed for vegetables and dark-green/orange vegetables after further adjustment for total daily energy intake and frequency of eating food from other restaurants (Table 2, Model 2).

In contrast, more frequent burger-and-fries restaurant use was related to lower intake of fruit, vegetables, whole grains, and fiber in models that included sociodemographic characteristics (Table 3, Model 1). More frequent burger-and-fries restaurant use (Table 3, Model 1) and sandwich/sub shop use (Table 4, Model 1) were similarly related to higher intake of total energy, total fat, satu-

rated fat, and sodium. Intake of sugar-sweetened beverages was also related to burger-and-fries restaurant use but not significantly related to sandwich/sub shop use. Compared to young adults who reported burger-and-fries restaurant use <1 time per week, nearly one additional sugar-sweetened beverage per day was consumed by those who reported burger-and-fries restaurant use on ≥ 3 occasions per week. With few exceptions, similar significant findings were observed after further adjustment for total energy intake and frequency of eating from other restaurants. Total energy and saturated fat intake were not related to sandwich/sub shop use in Model 2 (Table 4). However, Model 2 additionally showed an association between more frequent burger-and-fries restaurant use and lower intake of milk products and calcium (Table 3).

Restaurant Use and Weight Status

More frequent burger-and-fries restaurant use was related to a higher prevalence of overweight/obesity after adjusting for sociodemographic characteristics (Model 1: $\chi^2=27.3$, $P<0.001$), and additionally adjusting for frequency of eating food from other restaurants (Model 2: $\chi^2=24.0$, $P<0.001$). Full-service restaurant use and sandwich/sub shop use were unrelated to weight status in either model. Similar results were found when energy expended in physical activity was included as a covariate in the models and in separate analyses where the outcome was obese weight status (data not shown).

DISCUSSION

This study described patterns of away-from-home eating for different types of restaurants and associations with

Table 3. Burger-and-fries restaurant use and daily mean±standard error (SE) dietary intakes of young adult participants in Project EAT-III (Eating and Activity in Teens and Young Adults)

	Burger-and-Fries Restaurant Use ^a			Model 1 ^a		Model 2 ^b	
	<1 time n=1,408	1-2 times n=410	≥3 times n=153	F	P value	F	P value
	← mean±SE →						
Food (servings)^c							
Fruit	2.16±0.05	1.70±0.09	1.60±0.16	15.58	<0.001	33.90	<0.001
Vegetables	2.50±0.05	1.89±0.10	1.61±0.16	24.02	<0.001	40.16	<0.001
Dark-green/orange vegetables	0.75±0.02	0.56±0.03	0.46±0.06	24.36	<0.001	33.78	<0.001
Milk products	1.99±0.04	1.75±0.08	1.76±0.13	2.82	0.06	7.98	<0.001
Whole grains	2.00±0.04	1.63±0.08	1.69±0.13	9.00	<0.001	16.83	<0.001
Sugar-sweetened beverages	0.73±0.03	1.03±0.06	1.68±0.10	50.90	<0.001	41.09	<0.001
Nutrients							
Energy (kcal)	2,041±23	2,190±43	2386±73	12.08	<0.001	3.59	0.03
Energy from fat (%)	29.6±0.1	31.7±0.3	32.2±0.5	26.76	<0.001	15.33	<0.001
Energy from saturated fat (%)	10.1±0.1	10.9±0.1	11.1±0.2	20.85	<0.001	12.96	<0.001
Sodium (mg)	2,215±29	2,401±53	2,687±90	14.23	<0.001	0.33	0.72
Fiber (g)	19.9±0.3	17.2±0.5	17.9±0.9	8.77	<0.001	42.56	<0.001
Calcium (mg)	1,048±16	956±29	951±49	4.03	0.02	26.24	<0.001

^aThe weighted linear regression model is adjusted for sex, race/ethnicity, socioeconomic status, age, employment status, student status, and parental status.

^bThe weighted linear regression model is adjusted for the covariates in Model 1 as well as total energy intake (for all outcomes with the exceptions of energy, energy from fat, and energy from saturated fat) and the frequency of eating from other restaurants.

^cA daily serving was defined as the equivalent of ½ c for fruit and vegetables, 16 g for whole grains, and 1 c for milk products. For sugar-sweetened beverages, a serving was defined as the equivalent of one glass, bottle, or can.

Table 4. Sandwich/sub shop use and daily mean±standard error (SE) dietary intakes of young adult participants in Project EAT-III (Eating and Activity in Teens and Young Adults)

	Sandwich/Sub Shop Use ^a			Model 1 ^a		Model 2 ^b	
	<1 time n=1,407	1-2 times n=449	≥3 times n=107	F	P value	F	P value
	← mean±SE →						
Food (servings)^c							
Fruit	2.02±0.05	2.00±0.09	2.19±0.19	0.61	0.54	0.54	0.58
Vegetables	2.30±0.05	2.27±0.09	2.61±0.19	1.88	0.15	2.31	0.10
Dark-green/orange vegetables	0.68±0.02	0.69±0.03	0.79±0.07	1.31	0.27	2.60	0.07
Milk products	1.92±0.04	1.91±0.07	2.04±0.15	0.81	0.44	0.47	0.62
Whole grains	1.92±0.04	1.85±0.07	1.81±0.16	0.03	0.97	0.62	0.54
Sugar-sweetened beverages	0.84±0.03	0.89±0.06	0.97±0.12	1.99	0.14	2.03	0.13
Nutrients							
Energy (kcal)	2,048±23	2,161±40	2,491±85	12.09	<0.001	1.86	0.15
Energy from fat (%)	29.9±0.2	30.9±0.3	32.4±0.6	12.21	<0.001	4.56	0.01
Energy from saturated fat (%)	10.2±0.1	10.5±0.1	11.1±0.2	7.06	<0.001	1.89	0.15
Sodium (mg)	2,206±28	2,396±50	2,923±104	22.39	<0.001	10.58	<0.001
Fiber (g)	19.1±0.3	19.2±0.5	20.7±1.1	1.56	0.21	0.24	0.79
Calcium (mg)	1,014±16	1,027±27	1,113±57	2.18	0.11	0.60	0.55

^aThe weighted linear regression model is adjusted for sex, race/ethnicity, socioeconomic status, age, employment status, student status, and parental status.

^bThe weighted linear regression model is adjusted for the covariates in Model 1 as well as total energy intake (for all outcomes with the exceptions of energy, energy from fat, and energy from saturated fat) and the frequency of eating from other restaurants.

^cA daily serving was defined as the equivalent of ½ c for fruit and vegetables, 16 g for whole grains, and 1 c for milk products. For sugar-sweetened beverages, a serving was defined as the equivalent of one glass, bottle, or can.

dietary intake and weight status among young adults. The results suggest that young adults frequently patronize restaurants (with 95% reporting restaurant use at least once per week), and are more likely to eat food from a fast-food restaurant than a full-service restaurant during a given week. More frequent use of fast-food restaurants that primarily serve hamburgers and french fries was associated with higher risk for overweight/obesity; higher intake of sugar-sweetened beverages, total energy, total fat, and saturated fat; and with lower intake of healthful foods and key nutrients. These associations were observed above and beyond the influence of total frequency of restaurant use. In contrast, sandwich/sub shop use and full-service restaurant use were unrelated to weight status. Although sandwich/sub shop use was related to higher total energy, fat, and sodium intake, full-service restaurant use was related only to higher intake of vegetables and dark green/orange vegetables.

The findings build on previous studies in young adults and suggest future studies should examine influences on the availability and selection of healthy foods at restaurants. Consistent with prior research among university students, the current study, which utilizes a more diverse sample of both students and nonstudents, found that young adults were more likely to eat food from fast-food restaurants that primarily serve hamburgers and french fries or sandwiches/subs than other fast-food restaurants (3). Overall, there has been little prior research specifically examining associations between eating food from these types of fast-food restaurants, dietary intake, and weight status. However, the results of the current study are consistent with one previous study that related frequent burger-and-fries restaurant use to increased risk of type 2 diabetes (37). In regard to full-service restaurants, the findings of our study are also in line with studies that have shown associations of eating at nonfast-food restaurants (17) or community access to nonfast-food restaurants (20) with higher fruit and vegetable consumption.

Certain strengths and limitations are important to consider in drawing conclusions from this study. Early adulthood is an understudied life stage (38) and the large sample of young adult participants was diverse in terms of race, SES, student status, and parental status. A validated FFQ was used to comprehensively assess dietary intake (29,30); however, this FFQ was designed to measure usual consumption patterns for the past year and does not specifically assess restaurant menu choices. Therefore, it is not possible to draw clear conclusions about the nutritional quality of menu items purchased at different categories of restaurants. Whereas our study attempted to assess restaurant use by asking young adults how often they ate something from six categories of restaurants, it is possible the survey did not capture the full diversity of restaurants that influence their food choices and weight status. Because the restaurant use survey items were developed and piloted primarily among a young, Midwestern population, the generalizability of their restaurant choices may be limited. In addition, our study did not assess the nature of eating occasions that occurred at restaurants or how often young adults chose to get take-out or delivery vs dining in.

Study findings indicate there is a need for interventions to help young adults who report frequent fast-food

restaurant use to select healthy options. In particular, there is a need for health behavior messages to address the use of fast-food restaurants that primarily serve hamburgers and french fries and the consumption of foods from sandwich/sub shops that are high in fat and sodium. The results of this study and others suggest that effective efforts are needed to encourage young adults to alternatively prepare food at home when possible and provide tools to help in selecting healthy options when eating away from home (2,14,16,39). Dietetics practitioners can provide concrete tips to assist young adults in making healthy choices at restaurants (eg, drinking water or low-fat milk with meals) and help to address common perceived barriers to at-home food preparation such as time constraints and limited cooking skills (39).

CONCLUSIONS

The study results indicate that young adults frequently patronize restaurants, and most away-from-home eating occurs at fast-food restaurants. In addition, the results suggest that young adults who frequently eat food from burger-and-fries fast-food restaurants are at increased risk for overweight/obesity and poor dietary intake. Whereas sandwich/sub shop use and full-service restaurant use were unrelated to weight status, those who frequently eat food from sandwich/sub shops may be more likely to have high intakes of total energy, total fat, saturated fat, and sodium. In contrast, those who frequently eat food from full-service restaurants may be more likely to have higher intakes of vegetables and dark green/orange vegetables.

Future studies in young adult populations will be needed to confirm the results and develop a better understanding of the factors that influence food choice selections at restaurants. It will also be important for studies to examine how often young adult parents purchase food from restaurants for their children. If young adults are frequently purchasing food from restaurants for family meals, interventions for young adult parents should be designed to address dietary implications for their children. Finally, because legislation that requires chain restaurants to list energy content information on the menu will be going into effect in the near future, it will be important to assess if energy labeling helps young adults to choose nutrient-dense menu options.

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